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PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES OR OF LIMITED DISTRIBUTION, NO. 71: A CEREAL CYST NEMATODE

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Pest — *Heterodera latipons* Franklin

Synonym — *Bidera latipons* (Franklin) Krall and Krall

Order: Family — Tylenchida: Heteroderidae

Economic Importance — *H. latipons* was first noticed on roots of stunted and chlorotic wheat plants in Tripoli (Franklin 1969). In the winter of 1971, a 16-ha field of oats in Israel was plowed under because it was so heavily damaged by *H. latipons* and *Longidorus cohni* Heyns, 1969 (Cohn and Ausher 1973). The economic importance of *H. latipons* is difficult to assess because it has been confused with *H. avenae* Wollenweber, 1924 (Ritter 1982) and in some places, occurs in mixed populations with *H. avenae*.

Heterodera latipons distribution map (Prepared by Non-Regional Administrative Operations Office and Biological Assessment Support Staff, PPQ, APHIS, USDA).

General Distribution

Bulgaria, Cyprus, Greece, Iran, Israel, Italy, Japan, Libya, Soviet Union (Armenia, Tadzhikistan, Turkmen SSR, Ukraine), Spain, and Tunisia (Bowman 1976, Franklin 1969, Momota 1979, Nikitin 1979, Romero 1980, Tacconi 1976, Talatschian and Achyani 1976). Reports from Prince Edward Island, Canada, and Scotland are most likely H. hordecalis (Andersson, pers. comm.)

Hosts

Ammophila arenaria (marram grass), Avena sativa (oat), Hordeum vulgare (barley), Secale cereale (rye), and Triticum aestivum (wheat).

Characters

Data (measurements in micrometers) from Franklin (1969).

FEMALES - Length (excluding neck) = 525 (348-645), width = 414 (277-510), neck = 83 (58-103), stylet = 25 (21-28), opening of dorsal esophageal gland duct from stylet base = 3.7 (2.7-4.7).

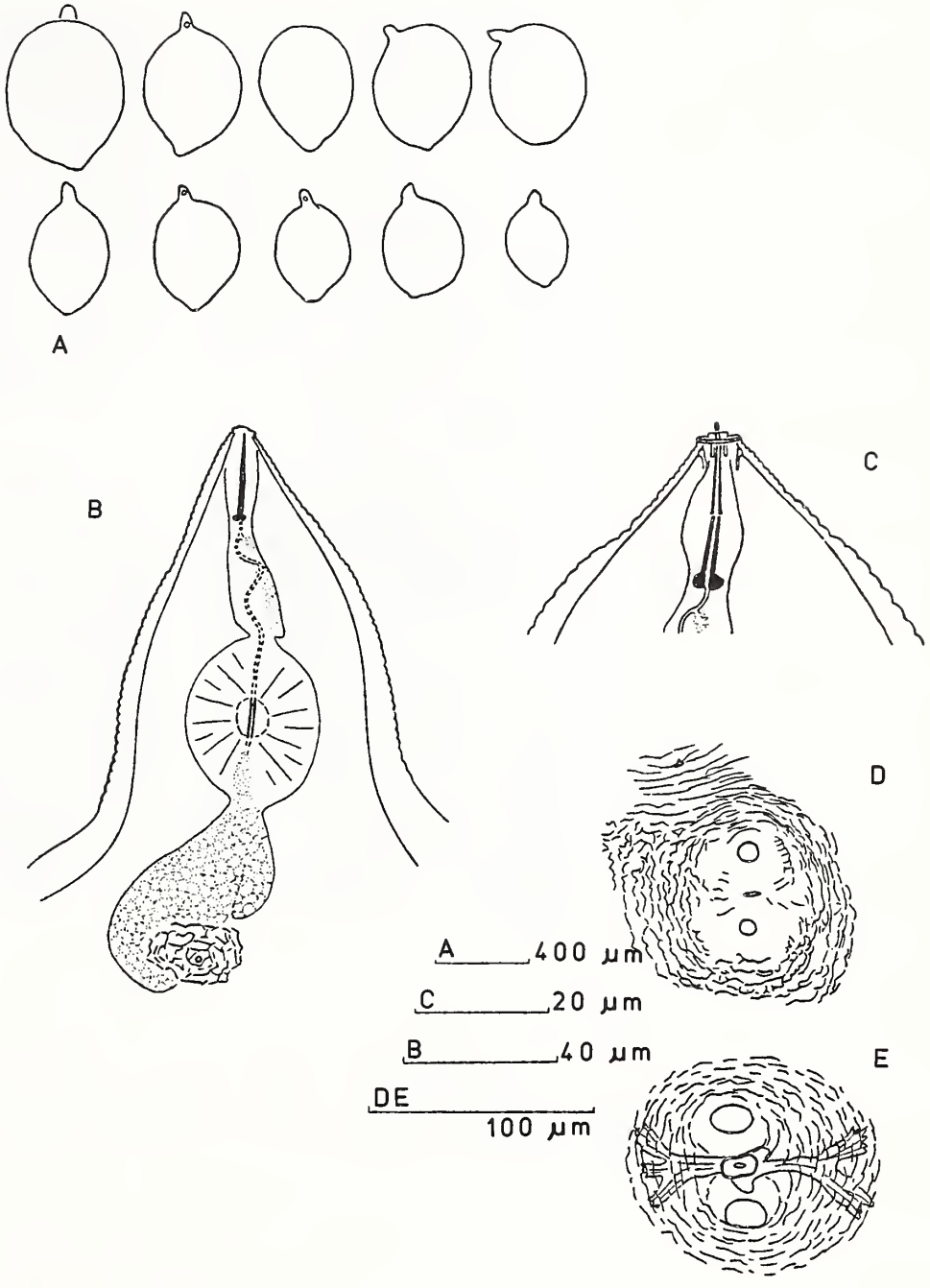
Body ovoid with small terminal vulval cone (Fig. 1A). Neck well defined (Fig. 1B), sometimes inclined at angle to long axis of body (Fig. 1A). Ratio of length to width of body about 1.3. Pattern on cuticle an angular network of ridges. Cuticle 9-15 µm thick on body, 5-8 µm on neck, and abruptly thinner (0.4-0.8 µm) forward opposite middle of stylet (Fig. 1C). Esophagus and reproductive organs typical of genus. Mature females covered with white subcrystalline layer that is easily detached. Older females become filled with eggs; small egg sac sometimes present without eggs. Vulva terminal, anus subterminal about 50-60 µm from vulva (Fig. 1D).

CYSTS - Fenestral length = 67 (58-76), width = 21 (15-27); semifenestral length = 17 (13-19); vulval slit = 7 (6-9); vulval bridge width = 33 (18-39); underbridge length = 103 (80-125), width = 11 (7-14).

Dark to midbrown. Semifenestra separated by distance greater than fenestral width (Figs. 1E, 2A-B). Vulval slit short (Figs. 1E, 2A). Underbridge strong with pronounced thickening in middle, ends splayed (Figs. 1E, 2B-D). Bullae usually absent, few sometimes at level of underbridge (Fig. 2C).

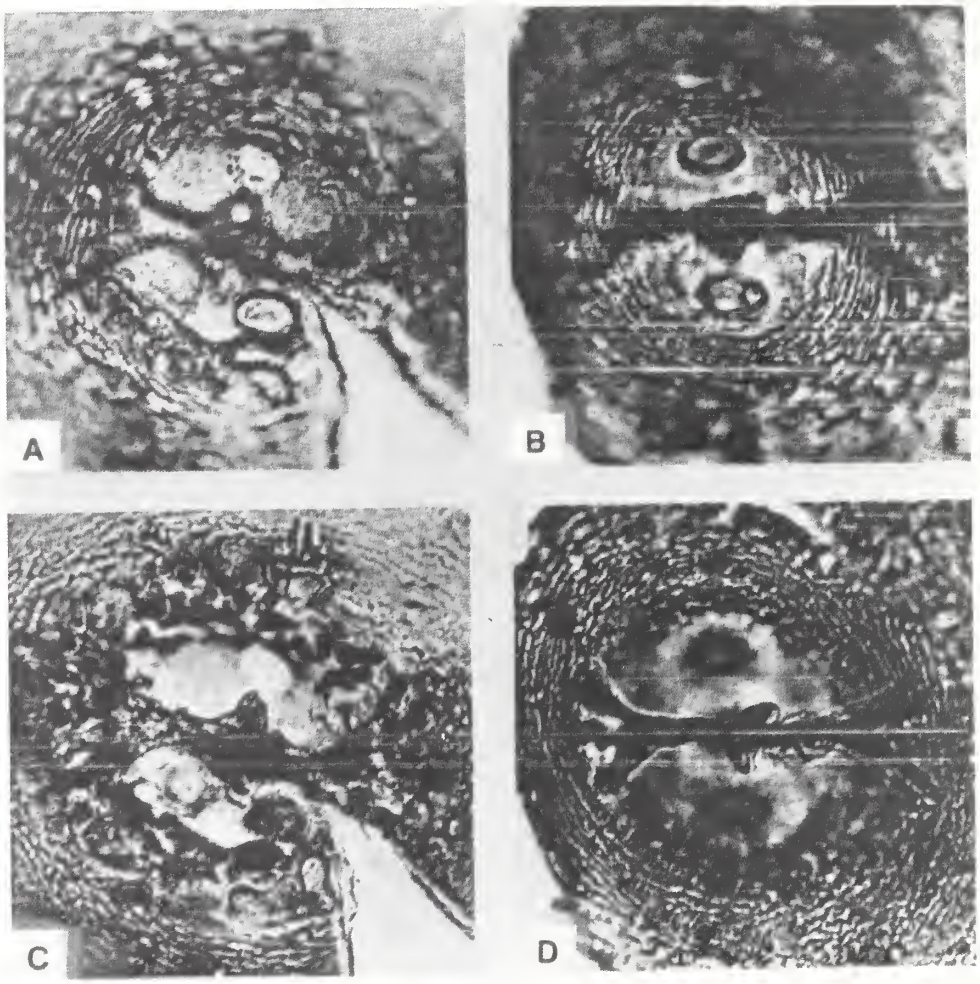
EGGS (embryonated) - Length = 112 (100-124), width = 48 (44-56). Juvenile folded four times.

(Fig. 1)



Heterodera latipons female. A. Mature. B. Anterior end with excretory pore. C. Head and stylet, lateral view. D. Cuticle of vulval region and anus in white cyst. E. Fenestralia and underbridge in brown cyst (From Nematologica, courtesy E. J. Brill).

(Fig. 2)



Heterodera latipons, end view of vulval cone. A. Vulval slit and semifenestrae. B. Underbridge and semifenestrae. C-D. Inside view. C. Underbridge of A with bullae. D. Underbridge of B without bullae (Photo by S. A. Clark from Nematologica, courtesy E. J. Brill).

MALES - Length = 1167 (960-1406), width = 28.5 (25-32.5), a = 41 (32-51), b (measured to base of median bulb) = 10.3 (8.9-11.3), stylet length = 26.7 (22-29), spicules (measured along arc) = 34 (32-36), gubernaculum = about 8.

Head offset with four postlabial annules (Fig. 3B), basal annule with 18-19 longitudinal grooves (Fig. 3I). Stylet knobs well defined, concave anteriorly (Fig. 3B). Dorsal esophageal gland duct opening 3-5 µm behind stylet knobs (Fig. 3B). Hemizonid about three annules wide, two body widths behind median bulb (Fig. 3B). Excretory pore 3-6 annules behind hemizonid (Fig. 3B). Lateral field with four longitudinal incisures, outer bands irregularly areolated throughout body (Fig. 3C). Testis single (Fig. 3A). Phasmids adanal (Fig. 3E). Tail less than one anal body width long (Figs. 3D-E).

JUVENILES - Length = 454 (401-478), width = 20.5 (19-22), a = 22.5 (20-25), tail = 47.8 (42-54), c = 9.5 (8-11), body width at anus = 15 (14-16), tail length/anal body width = 3.2 (3.0-3.7), length of hyaline tail tip = 26.5 (20-31), stylet = 23.8 (23-25), hyaline tail tip/stylet length = 1.1 (0.8-1.3), opening of dorsal gland duct from stylet base = 4.6 (4-5).

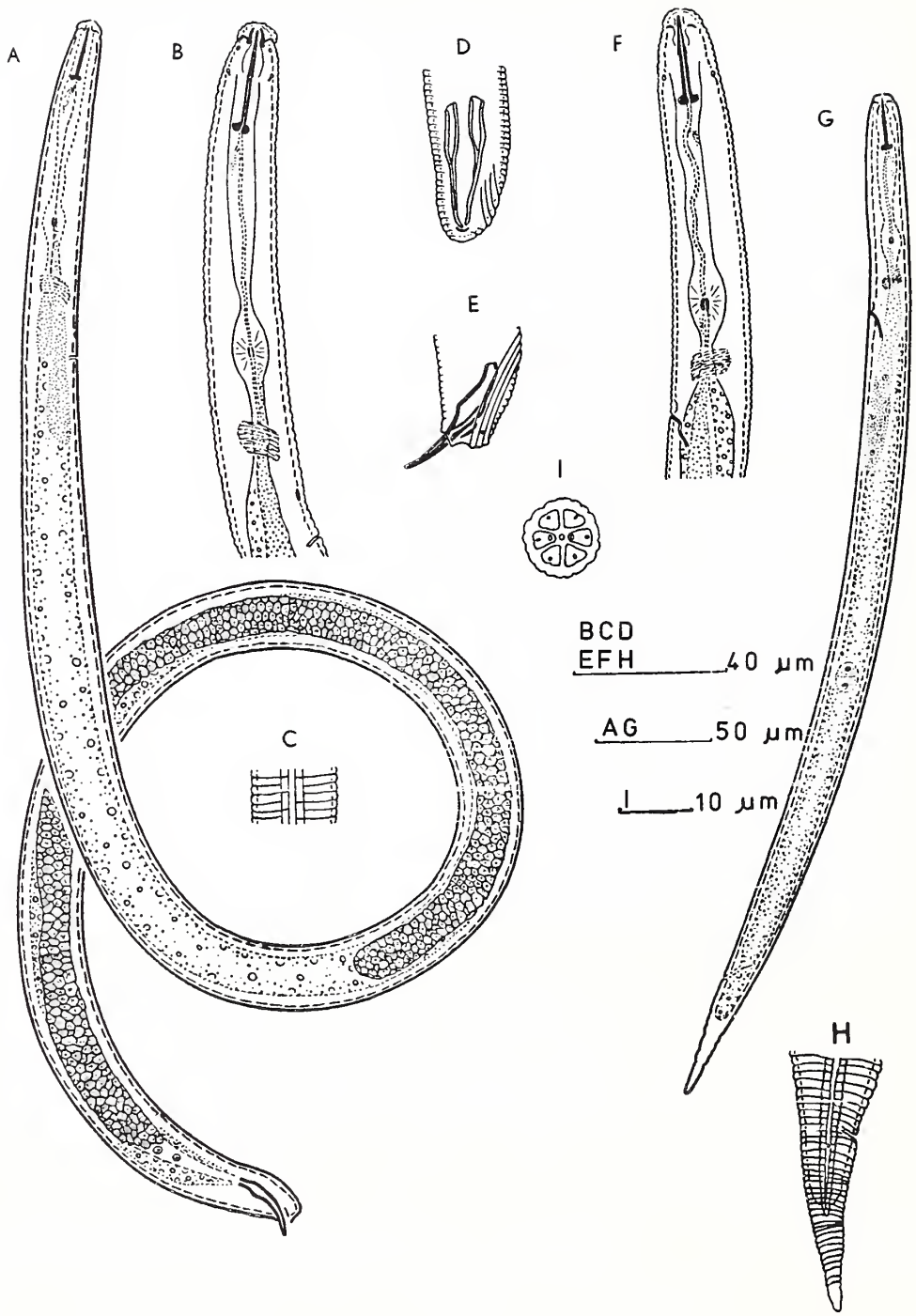
Head offset with three postlabial annules (Fig. 3F). Lateral field with four incisures, outer bands areolated (Fig. 3H). Stylet with well developed anteriorly concave knobs (Fig. 3F). Esophageal glands overlapping intestine latero ventrally to about 39 percent of body length (Fig. 3G). Excretory pore at level of or immediately behind hemizonid (Fig. 3F). Genital primordium at about 60 percent of body length (Fig. 3G). Phasmids 2-3 annules behind anus (Fig. 3H).

H. latipons is closely related to H. hordecalis from which it differs by the cyst having a shorter vulval slit (generally 6-9 µm versus 17-25.5 µm) and a less rigid vulval bridge. The hyaline tail is shorter in juveniles of H. latipons than of H. hordecalis, affecting the hyaline tail length/stylet length ratio--0.8-1.3 and 1.3-1.8, respectively.

Characteristic Damage

Symptoms are short roots, stunted plants, and yellowed leaves. Plants tend to wilt during warmer portions of the day. Symptoms occur in patches that enlarge as the nematode population increases.

(Fig. 3)



Heterodera latipons. A-E. Male. A. Entire. B. Esophageal region. C. Lateral field at mid body. D. Spicules ventral. E. Spicules lateral. F-H. Juvenile. F. Esophageal region. G. Entire. H. Tail. I. Male head at level of fourth annule, face view (From Nematologica, courtesy E. J. Brill).

Detection Notes

H. latipons cysts can be carried in soil, even minute amounts, on many different plant and nonplant products entering the United States. Before 1976, interceptions of lemon-shaped cysts were discarded without identification to species. Since then, H. latipons has been intercepted 12 times.

On imports, collect soil clinging to plant material by cutting off dirty roots or the base of bulbs. When soil is not apparent, tap or jar surface dust onto clean paper. Inspection stations can wash uncut plant material over screens. Be alert for soil on nonplant cargoes.

In the field the most reliable method for detection is the collection of soil samples in a grid pattern and processing by a wet screening method.

For identification, a minimum of 10 cysts with juveniles is desirable. Males and females will help in identifying field infestations.

Biology

The life cycle of H. latipons is essentially the same as for other species of Heterodera. Second-stage juveniles hatch from the cyst at planting time and penetrate host roots just behind the root tip. Juveniles feed, molt, enlarge, and become sedentary. Females break through the surface of the root, leaving the head and neck embedded. Males that have become wormlike move through the soil to inseminate females. When the female dies, the cuticle turns brown, and the body becomes a cyst filled with embryonated eggs, which develop to the second juvenile stage. The cysts break off from the roots and become free in the soil.

Cysts of H. latipons have been found to contain a few viable juveniles after being stored in dry soil for 5 years.

Control

The host range of H. latipons is restricted to the Poaceae. While no specific rotations have been recommended, any rotation with a nongrass crop should reduce nematode populations.

Natural Enemies

No natural enemies have been reported.

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